

## **REMARKS**

Claims 1-20 are now pending in the application. The Examiner is respectfully requested to add new claims 21 and 22, which recite subject matter fully supported in the Application as originally filed at: Figures 7-9; page 9, line 2 - page 10, line 21; page 12, lines 4-19; and claims 1, 10, and 11. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

### **NEW MATTER OBJECTION**

The Examiner objects to the previously-filed amendment under 35 U.S.C. 132 on the grounds that it introduces new matter into the disclosure as detailed below with reference to the written description rejection. The Examiner requires cancellation of the new matter. This objection is respectfully traversed and addressed below with respect to the written description rejection. Nevertheless, in order to expedite prosecution, Applicant has replaced the objectionable language with language that precisely tracks the language in the specification as originally filed at page 12, lines 14-15. Accordingly, it is respectfully requested that the instant objection be withdrawn.

### **REJECTION UNDER 35 U.S.C. § 112**

#### **FIRST PARAGRAPH**

Claim 16 stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement on the grounds that it claims subject

matter described in the application in a manner enabling one skilled in the art to practice the invention. This rejection is respectfully traversed.

The Examiner remarks that claim 16 is not enabled because the specification fails to disclose “approximating a system fine asymmetrical frequency response to a known fine asymmetrical response by selecting a weight for giving a mixture of instrument signals having different spectral qualities to the loudspeaker system, **and by selecting a frequency-dependent decision to invert the mixture**, such that the system overall frequency response, the system coarse asymmetrical frequency response, and system fine asymmetrical frequency response approximate a frequency response of an audible ensemble sound pattern produced by an ensemble” (emphasis added). Applicant respectfully notes that the specification at page 12, lines 4-19 describes the claimed subject matter in a manner enabling one skilled in the art to practice the invention. In particular, the cited portion of the specification describes that “multiple loudspeakers can be used ... for each instrument of a string quartet ... each speaker is driven by a weighted mixture of bridge and F-hole signals with possible inversion ... The resulting sound pattern leads to the fine structure of the instrument ... The result of the fine structure is that when the musician plays changing notes, the different high frequency harmonics are radiated in directions that change dramatically”. One skilled in the art may readily perceive from this description that it is necessary to select one or more frequency-dependent decisions to invert the mixture of spectrally different signals from a single instrument to a multi-driver speaker system in order to impart a fine structure to the instrument assigned to the multi-driver speaker system.

The Examiner remarks that a search of multiple dictionaries has failed to supply a clear definition of the word “invert” that applies to this context. However, Carver (U.S. Pat. No. 4,309,570) demonstrates use of the term in the art (Abstract) for using interference patterns between speakers to alter the perceived radiation of sound. Thus, one skilled in the art at the time the Application was filed would readily appreciate from the statements in the specification that the “weighted mixture” of spectrally different signals with “possible inversion” results in “changing notes” causing “the different high frequency harmonics” to be “radiated in directions that change dramatically” must be achieved by a frequency-dependent inversion of the signals because the changing of notes is frequency-dependent. The specification makes it clear that the inversion frequency or frequencies can be tuned by ear until the high frequency harmonics radiate in different directions as notes change such that some kind of fine structure is simulated (page 12, lines 10-13).

Nevertheless, in order to Expedite prosecution, Applicant has replaced the language to which the Examiner has objected with language that precisely tracks the language in the specification as originally filed at page 12, lines 14-15. Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claim 16 under 35 U.S.C. § 112, first paragraph.

#### SECOND PARAGRAPH

Claim 16 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

The Examiner remarks that claim 16 recites subject matter that is not adequately defined in the specification when it recites a “approximating a system fine asymmetrical frequency response to a known fine asymmetrical response by selecting a weight for giving a mixture of instrument signals having different spectral qualities to the loudspeaker system, **and by selecting a frequency-dependent decision to invert the mixture**, such that the system overall frequency response, the system coarse asymmetrical frequency response, and system fine asymmetrical frequency response approximate a frequency response of an audible ensemble sound pattern produced by an ensemble” (emphasis added). Applicant respectfully notes that the specification at page 12, lines 4-19 describes the claimed subject matter in a manner enabling one skilled in the art to practice the invention. In particular, the cited portion of the specification describes that “multiple loudspeakers can be used ... for each instrument of a string quartet ... each speaker is driven by a weighted mixture of bridge and F-hole signals with possible inversion ... The resulting sound pattern leads to the fine structure of the instrument ... The result of the fine structure is that when the musician plays changing notes, the different high frequency harmonics are radiated in directions that change dramatically”. One skilled in the art may readily perceive from this description that it is necessary to select one or more frequency-dependent decisions to invert the mixture of spectrally different signals from a single instrument to a multi-driver speaker system in order to impart a fine structure to the instrument assigned to the multi-driver speaker system. Applicant respectfully submits that claim 16 recites subject matter that is adequately defined in the specification.

The Examiner remarks that a search of multiple dictionaries has failed to supply a clear definition of the word “invert” that applies to this context. However, Carver (U.S. Pat. No. 4,309,570) demonstrates use of the term in the art (Abstract) for using interference patterns between speakers to alter the perceived radiation of sound. Thus, one skilled in the art at the time the Application was filed would readily appreciate from the statements in the specification that the “weighted mixture” of spectrally different signals with “possible inversion” results in “changing notes” causing “the different high frequency harmonics” to be “radiated in directions that change dramatically” must be achieved by a frequency-dependent inversion of the signals because the changing of notes is frequency-dependent. The specification makes it clear that the inversion frequency or frequencies can be tuned by ear until the high frequency harmonics radiate in different directions as notes change such that some kind of fine structure is simulated (page 12, lines 10-13).

Nevertheless, in order to Expedite prosecution, Applicant has replaced the language to which the Examiner has objected with language that precisely tracks the language in the specification as originally filed at page 12, lines 14-15. Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claim 16 under 35 U.S.C. § 112, second paragraph.

#### **REJECTION UNDER 35 U.S.C. § 103**

Claims 1 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Carver (U.S. Pat. No. 4,309,570) in view of Aronis (U.S. Pat. No. 4,175,466), further in view of *Illustrated Oxford Dictionary*, Oxford University Press, 1998, ISBN 0-

7894-3557-8, pages 1557-1559, and yet further in view of Tucker, *The Computer Science and Engineering Handbook*, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996, pages 1557-1559, and 1354-1360. This rejection is respectfully traversed.

The rejection is hereby challenged based on the Examiner's improper use of hindsight reasoning without a suggestion to combine the references.

Notwithstanding, independent claim 1 has been amended to recite "wherein a plurality of multi-driver loudspeaker systems have assigned instruments, with one instrument assigned to one loudspeaker system, and the sound waves simulate the ensemble sound pattern with at least one multi-driver loudspeaker system driven by a weighted mixture of spectrally different instrument signals with inversion capability, thereby causing different high frequency harmonics to radiate in directions that change as musical notes change". Claim 12 has been amended to recite similar subject matter. Support for these amendments may be found in the specification as originally filed at page 12, lines 4-19. In particular, the cited portion of the specification describes that "multiple loudspeakers can be used ... for each instrument of a string quartet ... each speaker is driven by a weighted mixture of bridge and F-hole signals with possible inversion ... The resulting sound pattern leads to the fine structure of the instrument ... The result of the fine structure is that when the musician plays changing notes, the different high frequency harmonics are radiated in directions that change dramatically". One skilled in the art may readily perceive from this description that driving multiple speakers with a weighted mixture of spectrally different instrument signals with possible inversion (or equivalently occasional inversion, potential inversion, inversion capability,

etc.) imparts a fine structure to the instrument assigned to the multi-driver speaker system.

In contrast, neither Carver, Aronis, Illustrated Oxford Dictionary, or Tucker teach, suggest, or motivate the claimed subject matter. These differences are significant because the present invention is able to simulate a live performance of multiple instruments having different fine structures for an audience of multiple listeners. None of the cited references, either alone or combined, is able to duplicate this capability as further explained below.

For example, Tucker's virtual reality speaker system employs a single, multi-driver speaker system, or else multiple, single-driver speaker systems, depending on one's perspective. The Examiner relies on Tucker to teach multiple, single-driver speaker systems with one instrument assigned to one speaker system by supposing a simple case in which one instrument is assigned to one speaker. At one point, the Examiner erroneously assumes that each speaker of Tucker has multiple drivers in order to balance the sound from different instruments. However, it is much more likely that one skilled in the art at the time Tucker was filed would assume that Tucker rebalances the sound signals before mixing them and sending them to the single speaker. Thus, the Examiner's interpretation constitutes hindsight reasoning following the influence of the teachings of the present invention. Further, even if the speakers of Tucker were to be interpreted as having multiple drivers, it is significant that Tucker teaches tracking the position of the listener's head in order to rebalance sound from different instruments among speakers at different locations to maintain the virtual reality effect. Thus, the virtual reality effect of Tucker may be accomplished with all of the

speakers oriented toward the listener by sharing instruments among speakers, and every example in Tucker of speakers (array of speakers, headphones) is consistent with single driver speakers oriented toward the listener with head tracking. Accordingly, there is no teaching in Tucker of a plural, multi-driver speaker system configurations each capable of inverting signals from an assigned instrument at one location to accomplish the fine structure of the assigned instrument. Thus, if different instruments are assigned to multiple speakers in Tucker, then it is necessary for each instrument to be balanced between many of the speakers at various, non-proximate locations; it follows that speakers will therefore share instruments. As a result, Tucker cannot create the virtual reality effect for multiple listeners, such as a theater audience, because it can only rebalance the sounds for a single, tracked listener location. Also, in order to view Tucker as teaching multiple speaker systems with one instrument to one speaker system, then it follows that each speaker system of Tucker is one speaker that is unable to impart a fine structure to its assigned instrument due to lack of ability to drive a multi-driver speaker system with a weighted mixture of spectrally different instrument signals with inversion capability. Conversely, in order to view Tucker as teaching a multi-driver speaker system capable of mixing and inverting multiple signals from an instrument to impart a fine structure to the instrument, then it follows that Tucker does not teach plural, multi-driver speaker systems with one instrument assigned to one speaker system. Moreover, Tucker does not teach mixing multiple signals from a single instrument with possible inversion to generate different high frequency harmonics that radiate in directions that change as musical notes change.



Also, Carver, Aronis, and Oxford English Dictionary fail to teach, suggest, or motivate “a plurality of multi-driver loudspeaker systems have assigned instruments, with one instrument assigned to one loudspeaker system, and the sound waves simulate the ensemble sound pattern with at least one multi-driver loudspeaker system driven by a weighted mixture spectrally different instrument signals with inversion capability, thereby causing different high frequency harmonics to radiate in directions that change as musical notes change”. The Examiner does not rely on these references in this capacity.

Therefore, Applicant respectfully requests the Examiner withdraw the rejection of independent claims 1 and 12 on these grounds, along with rejection of all claims dependent therefrom.

Claims 2-9 and 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Carver (U.S. Pat. No. 4,309,570) in view of Aronis (U.S. Pat. No. 4,175,466), further in view of *Illustrated Oxford Dictionary*, Oxford University Press, 1998, ISBN 0-7894-3557-8, pages 1557-1559, yet further in view of Tucker, *The Computer Science and Engineering Handbook*, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996, pages 1557-1559, and 1354-1360, still further in view of Logue (U.S. Pat. No. 6,279,379), yet still further in view of Routine Expedient (MPEP § 2144.04(VI)(C), (rearrangement of parts), even further in view of Applicant's alleged admission, and even still further in view of Sakai (U.S. Pat. No. 6,526,849. This rejection is respectfully traversed.

The rejection is hereby challenged based on the Examiner's improper use of hindsight reasoning without a suggestion to combine the references.

Applicant respectfully refers the Examiner to arguments made above with respect to claims 1 and 12 that relate to the Carver, Aronis, Illustrated Oxford Dictionary, and Tucker. The alleged "Routine Expedient" is also challenged as lacking support. Further, Applicant respectfully notes that the Examiner does not rely on Logue, Routine Expedient, Applicant's alleged admission, or Sakai to teach the subject matter recited in claims 1 and 12, especially as amended. Therefore, Applicant respectfully regards the rejections of claim 2-9 and 13-15 to be moot based on their respective dependency from allowable base claims 1 and 12.

Applicant respectfully requests the Examiner withdraw the rejections of claims 2-9 and 13-15 on these grounds based on their dependency from allowable base claims, along with rejection on these grounds of all claims dependent therefrom.

Claim 10 stands rejected under 35 U.S.C. 103(a) based on Carver (U.S. Pat. No. 4,309,570) in view of Aronis (U.S. Pat. No. 4,175,466), further in view of *Illustrated Oxford Dictionary*, Oxford University Press, 1998, ISBN 0-7894-3557-8, pages 1557-1559, yet further in view of Tucker, *The Computer Science and Engineering Handbook*, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996, pages 1557-1559, and 1354-1360, still further in view of Applicant's alleged admission, and yet still further in view of Sakai. This rejection is respectfully traversed.

Firstly, the rejection is hereby challenged based on the Examiner's improper use of hindsight reasoning without a suggestion to combine the references.

Secondly, Applicant respectfully refers the Examiner to arguments made above with respect to claim 1 relating to the Carver, Aronis, Illustrated Oxford Dictionary, and Tucker references. Further, Applicant respectfully notes that the Examiner does not rely

on Applicant's alleged admission, or Sakai to teach the subject matter recited in claim 1, especially as amended. Therefore, Applicant respectfully regards the rejection of claim 10 to be moot based on its dependency from allowable base claim 1 and intervening claim 2.

Thirdly, the Examiner relies on Applicant's alleged admission at page 10, line 17 "well-known theories for the radiation of a piston in an infinite baffle" to teach "generating audible sound waves which approximate a frequency dependence of radiation from front, back, and side surfaces of the assigned instrument". However, the well-known theories thus referenced merely confirm that one skilled in the art will readily understand how to select pistons when designing a multi-driver speaker system according to the teachings of the present invention. Thus, Applicant does not admit that approximating a frequency dependence of radiation from different instrument surfaces of a single instrument assigned to the speaker system is known in the prior art. In particular, the present invention teaches designing plural, multi-driver speaker systems for different instruments and imparting different fine structures to the instruments. Thus, Applicant has not admitted to the claimed subject matter, but merely asserted that one skilled in the art will be able to make and use the present invention after reading the disclosure.

Fourthly, Applicant respectfully notes that Sakai does not teach the subject matter recited in Claim 1, especially as amended, or the recitation in claim 10 of "generating audible sound waves which approximate a frequency dependence of radiation from front, back, and side surfaces of the assigned instrument". The Examiner does not rely on Sakai in either of these capacities.

Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claim 10 under 35 U.S.C. § 103(a) based on its dependency from allowable base and intervening claims, and also based on its own merits. Applicant also requests withdrawal of rejection on these grounds of all claims dependent therefrom.

Claim 11 stands rejected under 35 U.S.C. § 103(a) based on Carver (U.S. Pat. No. 4,309,570) in view of Aronis (U.S. Pat. No. 4,175,466), further in view of *Illustrated Oxford Dictionary*, Oxford University Press, 1998, ISBN 0-7894-3557-8, pages 1557-1559, yet further in view of Tucker, *The Computer Science and Engineering Handbook*, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996, pages 1557-1559, and 1354-1360, still further in view of Applicant's alleged admission, and yet still further in view of Sakai. This rejection is respectfully traversed.

The rejection is hereby challenged based on the Examiner's improper use of hindsight reasoning without a suggestion to combine the references.

Applicant respectfully refers the Examiner to arguments made above with respect to claims 1 and 10. Therefore, Applicant respectfully regards the rejection of claim 11 to be moot based on its dependency from allowable base claim 1 and intervening claims 2 and 10. Further, Applicant respectfully notes that well-known theories referenced in the section regarded as Applicant's alleged admission merely confirm that one skilled in the art will readily understand how to select pistons when designing a multi-driver speaker system according to the teachings of the present invention. Thus, Applicant does not admit to prior knowledge in the art of approximating a frequency dependence of radiation from different instrument surfaces of a single instrument assigned to the speaker system. In particular, the present invention teaches front and rear speaker

drivers with piston diameters selected to accomplish the frequency dependence of radiation of a particular type of assigned instrument. The well-known theories thus referenced merely confirm that one skilled in the art will readily recognize how to select the appropriate piston diameters, and not that the speaker driver configuration of the present invention is taught by these theories.

Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claim 11 under 35 U.S.C. § 103(a) based on its dependence from allowable base and intervening claims, and also based on its own merits.

Claim 16 stands rejected under 35 U.S.C. § 103(a) based on Sims (U.S. Pat. No. 5,206,913) in view of Tucker, *The Computer Science and Engineering Handbook*, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996, pages 1557-1559, and 1354-1360, still further in view of Applicant's alleged admission, and yet still further in view of *Illustrated Oxford Dictionary*, Oxford University Press, 1998, ISBN 0-7894-3557-8, pages 1557-1559, Oxford University Press, 1998, ISBN 0-7894-3557-8, pages 1557-1559. This rejection is respectfully traversed.

The rejection is hereby challenged based on the Examiner's improper use of hindsight reasoning without a suggestion to combine the references.

Notwithstanding, independent claim 16 has been amended to recite, "driving at least one multi-driver loudspeaker system by a weighted mixture of spectrally different instrument signals with inversion capability, thereby causing different high frequency harmonics to radiate in directions that change as musical notes change". In contrast, none of the cited references teach, suggest, or motivate the claimed subject matter, especially as amended. These differences are significant for reasons detailed above

with respect to claim 1 for Tucker and with respect to claims 10-11 for Applicant's alleged admission. Further, the Examiner erroneously invokes Aronis (U.S. Pat. No. 4,175,466) at column 10, line 17 to teach "selecting a frequency-dependent decision to invert the mixture". However, Aronis merely mentions that electrical signals from different instrument strings "can be amplified, modulated, processed, or otherwise utilized" in the cited text. There is no mention of frequency-dependent inversion, and especially no teaching of imparting a fine structure to an assigned instrument, such that different high-frequency harmonics radiate in directions that change as musical notes change. Still further, Sims does not teach the recited subject matter, especially as amended, and the Examiner does not rely on Sims in this capacity. Thus, the cited references, alone or combined, fail to teach all of the limitations recited in claim 1. These differences are significant for reasons fully explored above with respect to claims 1 and 12.

Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claim 16 on these grounds, along with all claims dependent therefrom.

Claims 17-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sims (U.S. Pat. No. 5,206,913) in view of Tucker, *The Computer Science and Engineering Handbook*, by Allen B. Tucker, CRC Press, ISBN: 0-8493-2909-4, 1996, pages 1557-1559, and 1354-1360, further in view of Applicant's alleged admission, still further in view of *Illustrated Oxford Dictionary*, Oxford University Press, 1998, ISBN 0-7894-3557-8, pages 1557-1559, yet still further in view of Krauss (U.S. Pat. No. 2,806,953), and even still further in view of Aronis (U.S. Pat. No. 4,175,466). This rejection is respectfully traversed.

The rejection is hereby challenged based on the Examiner's improper use of hindsight reasoning without a suggestion to combine the references.

The rejection of claims 17-20 is respectfully deemed moot in view of their dependency from claims considered in condition for allowance as detailed above with respect to rejection of claim 16.

Therefore, Applicant respectfully requests the Examiner withdraw the rejection of claims 17-20 on these grounds.

#### **ADDED CLAIMS**

Applicant respectfully draws the Examiner's attention to added claims 20 and 21. Support for these added claims can be found in the specification as originally filed at: Figures 7-9; page 9, line 2 - page 10, line 21; page 12, lines 4-19; and claims 1, 10, and 11.

#### **CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: March 24, 2004

By: 

Monte L. Falcoff  
Reg. No. 37,617

HARNESS, DICKEY & PIERCE, P.L.C.  
P.O. Box 828  
Bloomfield Hills, Michigan 48303  
(248) 641-1600